

DAIRY-UPDATE

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INOCULANTS

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Silages make up 50% of most dairy rations. The quality of the silage is then, a key determinant of profitability. Having high quality silages makes balancing the diet easy because poor quality silages require more, and more expensive, complementary feedstuffs.

The quality of the preserved silage is dictated by the forage quality at harvest and the management applied from ensiling to feed-out. Ensiling occurs naturally, but it is not a controlled process.

Research has proven that microbial inoculants can help to maximize the retention and preservation of nutrients and dry-matter in the silage. Inoculants are safe, noncorrosive, and environmentally friendly.

Fermentation

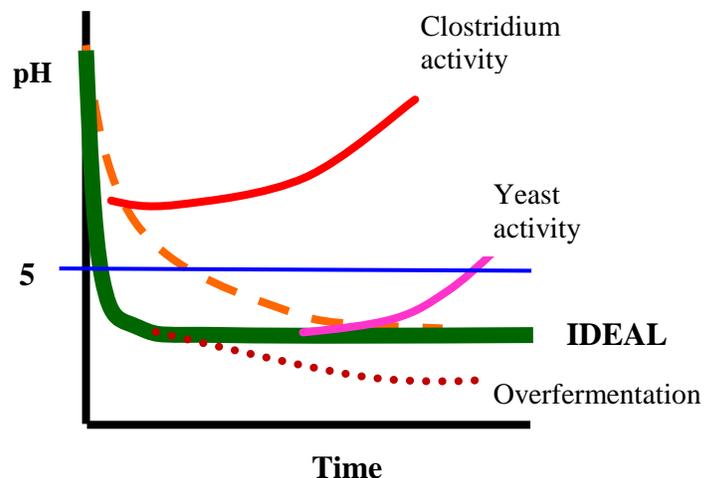
Ensiling fermentation needs to be controlled. Ideally, pH should drop very quickly and then stabilize (see Figure 1).

A SLOW pH drop can be caused by several factors:

- *Inefficient (heterolactic) fermentation*
- *fermentation by enterobacteria*
- *growth of aerobic organisms*

Additional fermentation can be triggered by clostridium and yeast. Silage dry matter is converted into carbon dioxide & other by-products, causing plant-protein breakdown and spoilage.

Figure 1. pH drop in ideal and non-ideal silage fermentation conditions



Haylage

When ensiled, legumes such as alfalfa and red clover are harder to acidify (compared to corn) because of the higher concentration of protein, organic acids and minerals which resist the pH drop (they have a buffering capacity).

For this situation, traditional inoculants that contain species of lactic acid bacteria are used to efficiently convert soluble sugars to lactic acid. Transforming the sugars to lactic acid only (homo-fermentation) results in the highest recoveries of dry-matter and energy. Lactic acid is a strong acid, and produces a rapid pH drop, protecting the silage from undesired fermentations by clostridia, enterobacteria or yeast.

Corn Silage

Because of its high content of starch and sugars, corn silage is more prone to heating during feed-out when piled or left sitting in a second batch in the summertime.

In this case, a second type of inoculants aims to improve the aerobic stability and feed-out characteristics. These inoculants prevent dry matter loss and heating in the silage mass or feed bunk.

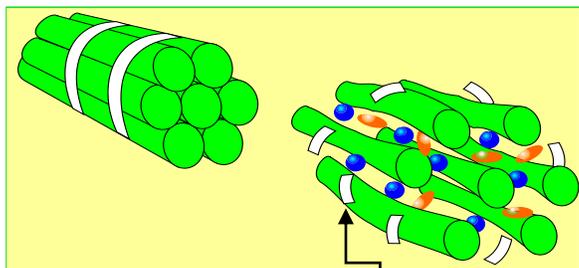
Lactobacillus buchneri (heterolactic) converts moderate amounts of lactic acid produced during active fermentation into acetic acid, a strong antifungal compound. This prevents yeast growth in aerobic conditions. The process occurs slowly and these bacteria are more sensitive to lower pH, so higher application rates are required (400,000 vs 100,000 CFU/g).

Enzymes

The inoculant package may also contain enzymes. These enzymes break down non-cellulosic forage fibres (Figure 2), provide sugars for acid production and improve microbial access to cellulosic fibres in the rumen.

Figure 2.

Plant fibers structure and enzyme action



The enzymes acting on non-cellulosic fibers, release cellulose fibers for microbial activity

This enzyme activity also improves the cow's rate of digestion of fresh, chopped silage in the rumen fluid (Table 1).

Table 1. Effect of enzyme presence in the inoculant on the fiber NDF digestibility

	TREATMENT		Std error	Contrast ²
	Control (A)	Enzyme (B)		A vs B
Dry matter, %	34.0	31.0	0.35	0.01 *
NDF, % of DM	41.5	42.1	0.99	0.64
NDF-D ¹ , % of NDF	35.3	39.4	1.07	0.02 *
pH	3.6	3.5	0.03	0.11
Lactate, % of DM	8.5	9.5	0.28	0.02 *

¹ NDF-D = 24 h in vitro NDF digestibility

² Comparison A vs B, probability test at P<0.05

* significant effect

Ask us about

BIOTAL Buchneri 500

(Pediococcus pentosaceus and Lactobacillus buchneri + enzymes)

BIOTAL Supersile

(Pediococcus acidilactici and Lactobacillus plantarum + enzymes)

*** orders of less than 10 pouches of Buchneri 500 or less than 20 pouches of Supersile will incur Purolator charges***

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